(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 January 2004 (22.01.2004)

PCT

(10) International Publication Number
WO 2004/008794 A3

(51) International Patent Classification[7]: H04Q 7/36

(21) International Application Number: PCT/GB2003/003070

(22) International Filing Date: 15 July 2003 (15.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0216291.5 15 July 2002 (15.07.2002) GB

(71) Applicant *(for all designated States except US)*: **KING'S COLLEGE LONDON** [GB/GB]; The Strand, London WC2R 2LS (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **AGHVAMI, Abdol, Hamid** [GB/GB]; Centre for Telecommunications Research, King's College London, The Strand, London, Greater London WC2R 2LS (GB). **SAID, Fatin** [GB/GB]; Centre for Telecommunications Research, King's College London, The Strand, London, Greater London WC2R 2LS (GB). **GHORASHI, Seyed, Ali** [IR/GB]; Centre for Telecommunications Research, King's College London, The Strand, London, Greater London WC2R 2LS (GB). **WANG, Lin** [CN/GB]; Centre for Telecommunications Research, King's College London, The Strand, London, Greater London WC2R 2LS (GB).

(74) Agent: **CASBON, Paul, Richard**; Lucas & Co., 135 Westhall Road, Warlingham, Surrey CR6 9HJ (GB).

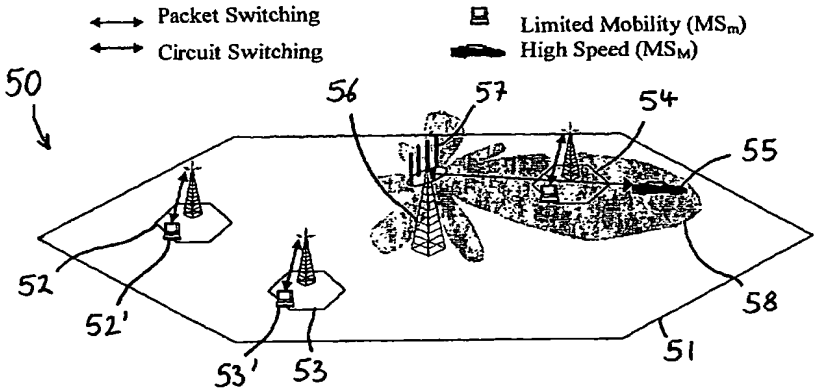
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— *of inventorship (Rule 4.17(iv)) for US only*

[Continued on next page]

(54) Title: CELLULAR COMMUNICATIONS SYSTEMS



(57) Abstract: A method of operating a cellular communications system comprising at least one macro cell having a macro cell base station and at least one micro cell having a micro cell base station, at least part of the micro cell being located within an area served by the macro cell base station, which method comprises the steps of: (1) receiving an electronic indication representative of the quality of service at one or more cellular communications devices served by the macro cell base station; (2) electronically processing the or each electronic indication to obtain a comparison with a predetermined threshold for said quality of service; and (3) electronically controlling signals emitted from the micro cell base station in response to said comparison such that the quality of service of any cellular communication device(s) served by the macro cell base station that are within a predetermined range of the micro cell base station exceeds said predetermined threshold so as to permit the transmission and reception of data in the micro and macro cells on substantially the same frequency band(s).

WO 2004/008794 A3

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
18 March 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/[redacted]03/03070

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04Q7/36

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 920 819 A (ASANUMA YUTAKA) 6 July 1999 (1999-07-06) abstract column 1, line 4 - column 5, line 22 column 7, line 33 - column 9, line 18 figures -----	1-6, 20-26, 41-46
A	KOJIMA F ET AL: "Radio resource management technique for multilayered cell system with different bandwidths" ELECTRONICS LETTERS, IEE STEVENAGE, GB, vol. 33, no. 15, 17 July 1997 (1997-07-17), pages 1297-1298, XP006007743 ISSN: 0013-5194 the whole document -----	1-46

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 September 2003	16.01.04

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Aguilar Cabarrus, E

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 548 806 A (MIZUNO TOSHIO ET AL) 20 August 1996 (1996-08-20) abstract column 2, line 14 - column 5, line 67 figures -----	1-46

INTERNATIONAL SEARCH REPORT

...onal application No.
PCT/GB 03/03070

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-46

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-46

Invention I is directed to a method of operating a cellular communication system in a hierarchical cell structure, in which an electronic indication representative of the quality of service of the communication devices served by the macro cell base stations is received, processed and compared with a predetermined threshold for said quality of service, and in response to that, the signals emitted by the micro cell station are electronically controlled.

---

2. claims: 47-48

Invention II is directed to a method of operating a cellular communication system in a hierarchical cell structure, in which transmission data are prioritised to a first group of cellular communication devices served by the micro cell base station that require real-time data above a second group of devices that require non real-time data.

INTERNATIO[redacted] SEARCH REPORT

Interna[redacted]pplication No
PCT/[redacted]03/03070

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5920819	A	06-07-1999	JP	3241261 B2	25-12-2001
			JP	9238381 A	09-09-1997
			DE	19708309 A1	04-09-1997
US 5548806	A	20-08-1996	JP	2669288 B2	27-10-1997
			JP	6224828 A	12-08-1994
			JP	2789987 B2	27-08-1998
			JP	6237208 A	23-08-1994